

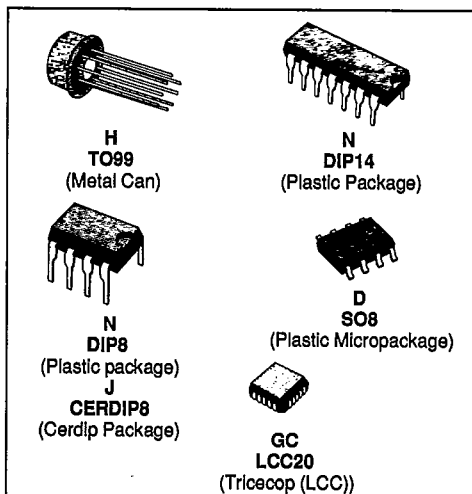


SGS-THOMSON

30E D

**GENERAL-PURPOSE SINGLE OP-AMPS**

- LARGE INPUT VOLTAGE RANGE
- NO LATCH-UP
- HIGH GAIN
- SHORT-CIRCUIT PROTECTION
- NO FREQUENCY COMPENSATION REQUIRED
- SAME PIN CONFIGURATION AS THE UA709



**DESCRIPTION**

The UA741 is a high performance monolithic operational constructed on a single silicon chip. It is intended for a wide range of analog applications.

- Summing amplifier
- Voltage follower
- Integrator
- Active filter
- Function generator.

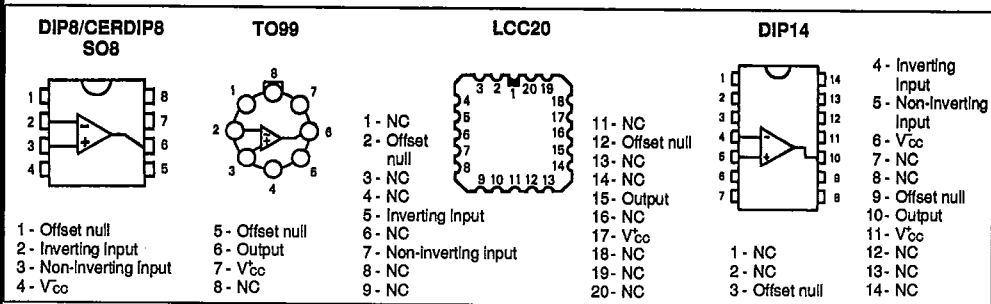
The high gain and wide range of operating voltages provides superior performance integrator, summing amplifier, and general feedback applications. the internal compensation network (6 dB/octave) insures stability in closed loop applications.

**ORDER CODES**

Part Number	Temperature Range	Package					
		H	J	GC	N	N14	D
UA741C/E	0 °C to + 70 °C	•	•		•	•	•
UA741I	-40 °C to + 105 °C	•			•	•	
UA741M/A	-55 °C to + 125 °C	•	•	•			

**Note :** Hi-Rel Versions Available  
**Examples :** UA741CN, UA741IH

**PIN CONNECTIONS (top views)**

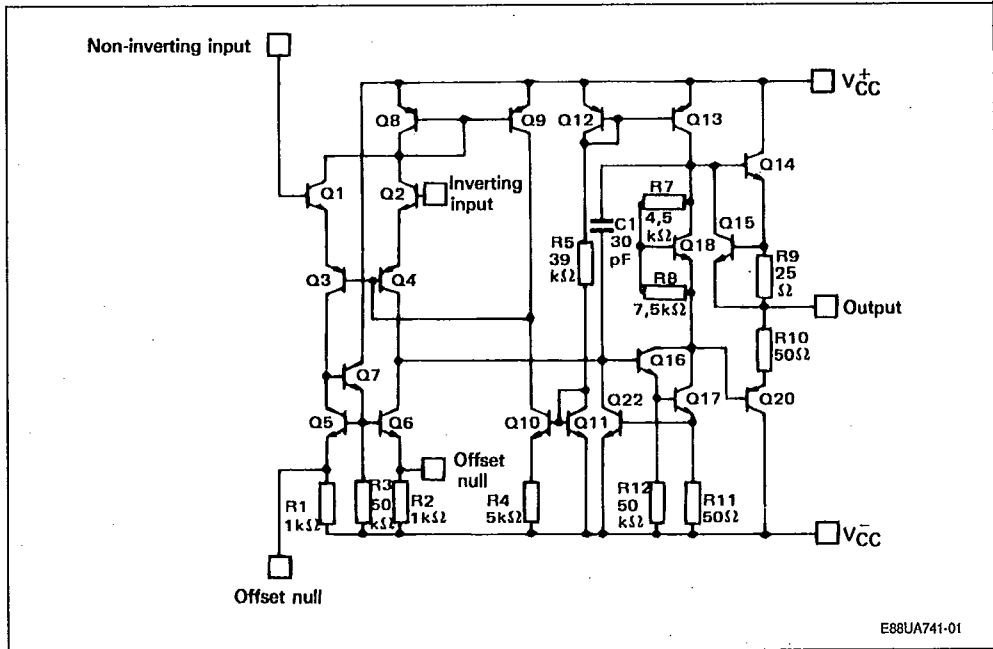


ABSOLUTE MAXIMUM RATINGS S G S-THOMSON

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Symbol	Parameter	Value			Unit
		UA741M, A	UA741I	UA741C, E	
V <sub>CC</sub>	Supply Voltage	± 22	± 22	± 22	V
V <sub>I</sub>	Input Voltage	± 15	± 15	± 15	V
V <sub>id</sub>	Differential Input Voltage	± 30	± 30	± 30	V
P <sub>tot</sub>	Power Dissipation	500	500	500	mW
	Output Short-circuit Duration	Infinite			
T <sub>oper</sub>	Operating Free-air Temperature Range	- 55 to + 125	- 40 to + 105	0 to + 70	°C
T <sub>stg</sub>	Storage Temperature Range	- 65 to 150	- 65 to 150	- 65 to 150	°C

SCHEMATIC DIAGRAM



E88UA741-01

Case	Offset Null	Inverting Input	Non-Inverting Input	V <sub>CC</sub>	V <sub>CC</sub>	Output	N.C.
TO99/DIP8/CERDIP8/SO8	1, 5	2	3	4	7	6	8
DIP14	3, 9	4	5	6	11	10	*
LCC20	2, 12	5	7	10	17	15	*

\* TO116, LCC20 : Other pins are not connected.

## ELECTRICAL CHARACTERISTICS

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UA741M/A : -55 °C ≤ T<sub>amb</sub> ≤ +125 °C, V<sub>CC</sub> = ±15 VUA741I : -40 °C ≤ T<sub>amb</sub> ≤ +105 °C, V<sub>CC</sub> = ±15 VUA741C/E : 0 °C ≤ T<sub>amb</sub> ≤ +70 °C, V<sub>CC</sub> = ±15 V

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(unless otherwise specified)

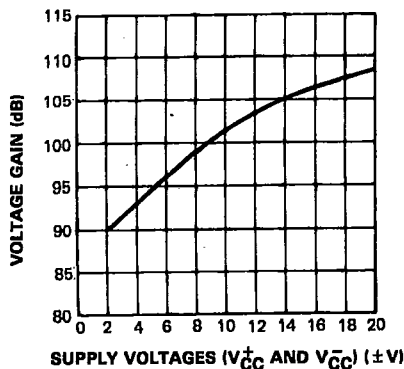
Symbol	Parameter	UA741C, E, I, M, A			Unit
		Min.	Typ.	Max.	
V <sub>IO</sub>	Input Offset Voltage R <sub>S</sub> ≤ 10 kΩ T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub> UA741E, A T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		1	5 6 2 4	mV
I <sub>IO</sub>	Input Offset Current T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		2	20 40	nA
I <sub>B</sub>	Input Bias Current T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		10	100 200	nA
A <sub>VD</sub>	Large Signal Voltage Gain (V <sub>O</sub> = ±10 V, R <sub>L</sub> = 2 kΩ) T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio (R <sub>S</sub> ≤ 10 kΩ) T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	77 77	90		dB
I <sub>CC</sub>	Supply Current, no Load T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		1.7	2.8 3.3	mA
V <sub>I</sub>	Input Voltage Range T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	-12 -12		+12 +12	V
CMR	Common Mode Rejection Ratio (R <sub>S</sub> ≤ 10 kΩ) T <sub>amb</sub> = 25 °C T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	70 70	90		dB
I <sub>OS</sub>	Output Short-circuit Current T <sub>amb</sub> = 25 °C	10	25	40	mA
±V <sub>OPP</sub>	Output Voltage Swing T <sub>amb</sub> = 25 °C R <sub>L</sub> = 10 kΩ R <sub>L</sub> = 2 kΩ T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub> R <sub>L</sub> = 10 kΩ R <sub>L</sub> = 2 kΩ	12 10 12 10	14 13		V
S <sub>VO</sub>	Slew-rate (V <sub>I</sub> = ±10 V, R <sub>L</sub> = 2 kΩ, C <sub>L</sub> ≤ 100 pF, T <sub>amb</sub> = 25 °C, unity gain)	0.25	0.5		V/μs
t <sub>r</sub>	Rise Time (V <sub>I</sub> = ±20 mV, R <sub>L</sub> = 2 kΩ, C <sub>L</sub> ≤ 100 pF, T <sub>amb</sub> = 25 °C, unity gain)		0.3		μs
K <sub>OV</sub>	Overshoot (V <sub>I</sub> = ±20 mV, R <sub>L</sub> = 2 kΩ, C <sub>L</sub> ≤ 100 pF, T <sub>amb</sub> = 25 °C, unity gain)		5		%
R <sub>I</sub>	Input Resistance, T <sub>amb</sub> = 25 °C	0.3	2		mΩ

**ELECTRICAL CHARACTERISTICS (continued)**

Symbol	Parameter	UA741C, E, I, M, A			Unit
		Min.	Typ.	Max.	
GPB	Gain Bandwidth Product ( $V_I = 10\text{ mV}$ , $R_L = 2\text{ k}\Omega$ , $C_L \leq 100\text{ pF}$ , $f = 100\text{ kHz}$ , $T_{amb} = 25\text{ }^\circ\text{C}$ )	0.7	1	1.6	MHz
THD	Total Harmonic Distortion ( $f = 1\text{ kHz}$ , $A_V = 20\text{ dB}$ , $R_L = 2\text{ k}\Omega$ , $V_O = 2\text{ V}_{pp}$ , $C_L \leq 100\text{ pF}$ , $T_{amb} = 25\text{ }^\circ\text{C}$ )		0.06		%
$V_N$	Equivalent Input Noise Voltage ( $f = 1\text{ kHz}$ , $R_G = 100\text{ }\Omega$ )		23		$nV/\sqrt{Hz}$
	Phase Margin		50		Degrees

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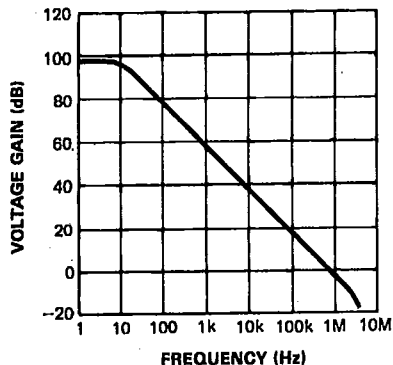
**OPEN LOOP VOLTAGE GAIN (Typ.)**



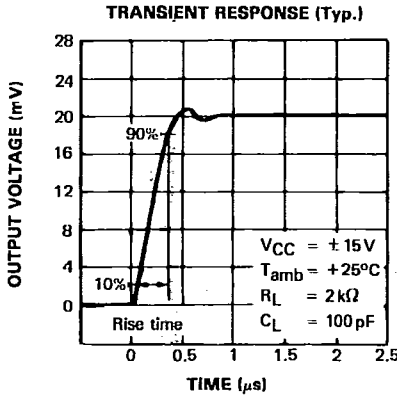
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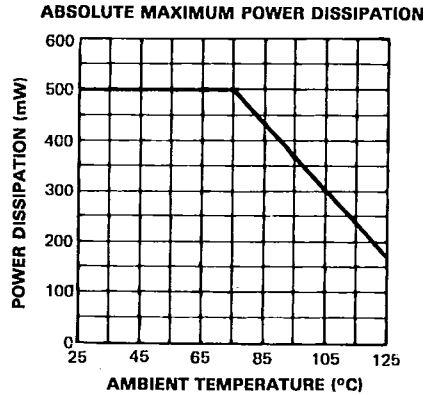
**OPEN LOOP FREQUENCY RESPONSE (Typ.)**



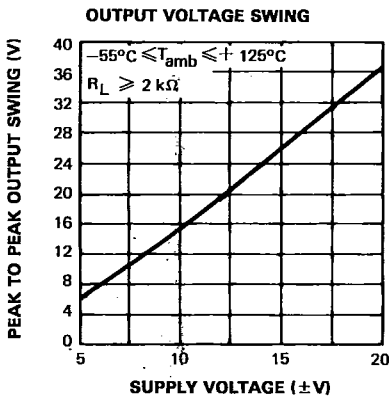
E88UA741-03



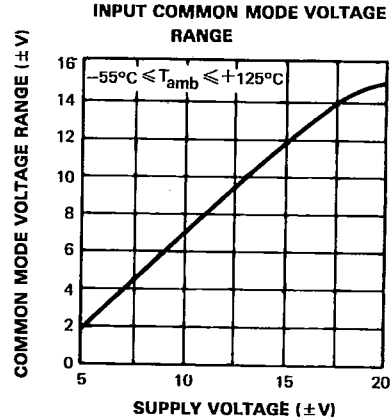
E88UA741-04



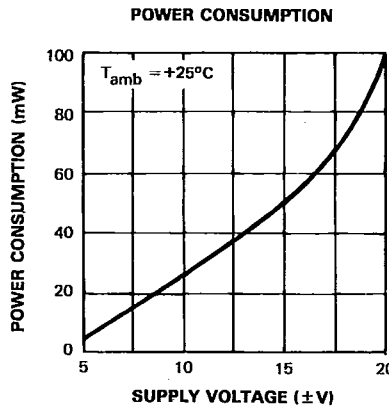
E88UA741-05



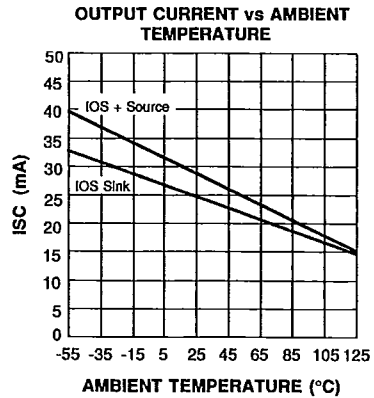
E88UA741-06



E88UA741-07



E88UA741-08

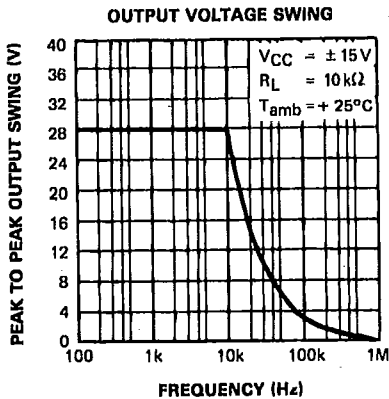
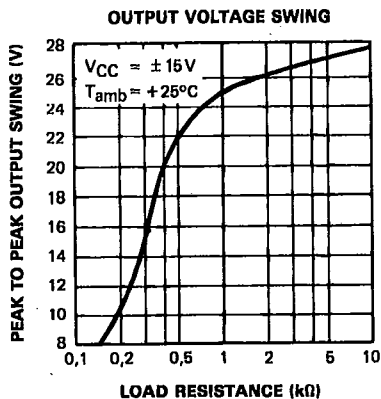


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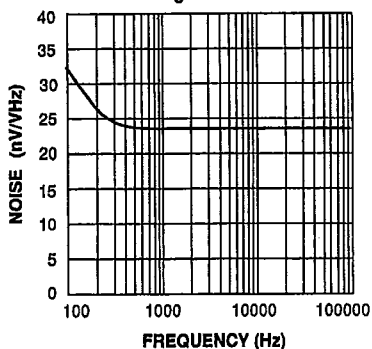
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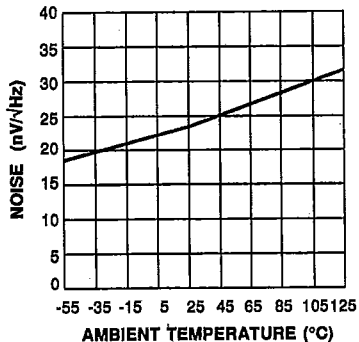


E88UA741-10  
**EQUIVALENT INPUT NOISE vs FREQUENCY**  
 $R_g = 100 \Omega$



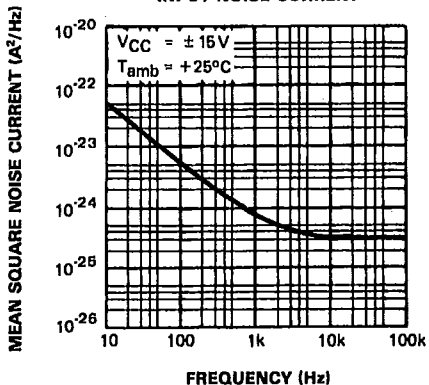
E88UA741-12

**EQUIVALENT INPUT NOISE vs AMBIENT TEMPERATURE**



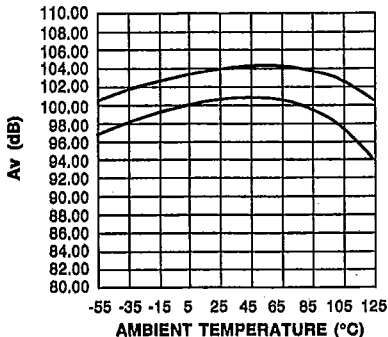
E88UA741-14

E88UA741-11  
**INPUT NOISE CURRENT**



E88UA741-13

**LARGE SIGNAL VOLTAGE GAIN vs AMBIENT TEMPERATURE**

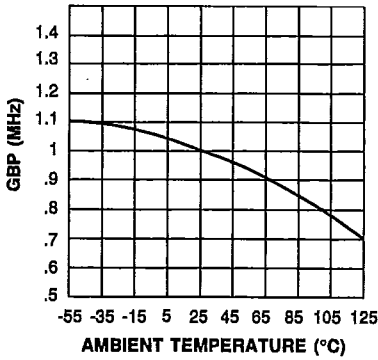


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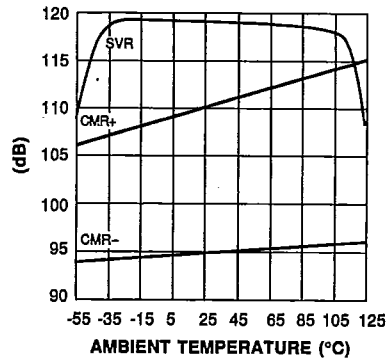
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**GAIN BANDWIDTH PRODUCT vs AMBIENT TEMPERATURE**



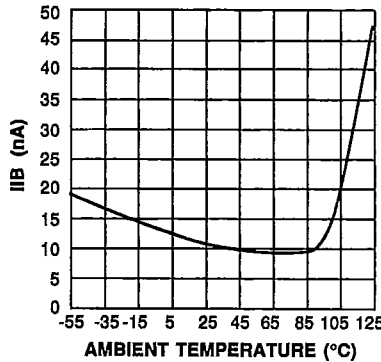
E88UA741-16

**POWER SUPPLY & COMMON MODE REJECTION RATIO vs AMBIENT TEMPERATURE**



E88UA741-17

**INPUT BIAS CURRENT vs AMBIENT TEMPERATURE**



E88UA741-18

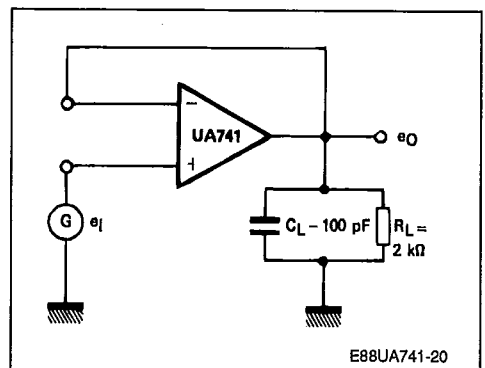
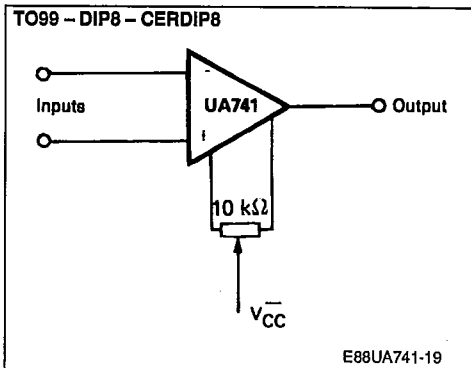
**MEASUREMENT DIAGRAMS**

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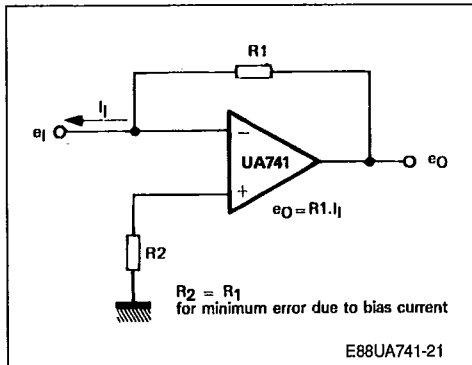
**VOLTAGE OFFSET NULL CIRCUIT**

**TRANSIENT RESPONSE TEST CIRCUIT**

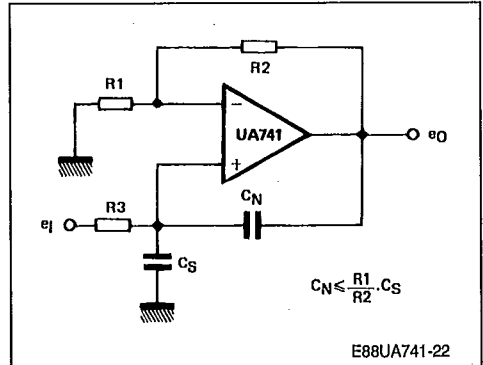


MEASUREMENT DIAGRAMS (continued)

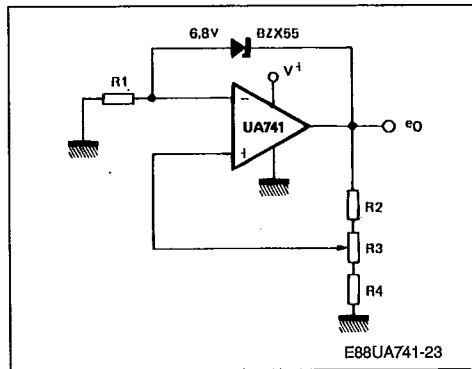
CURRENT TO VOLTAGE CONVERTER



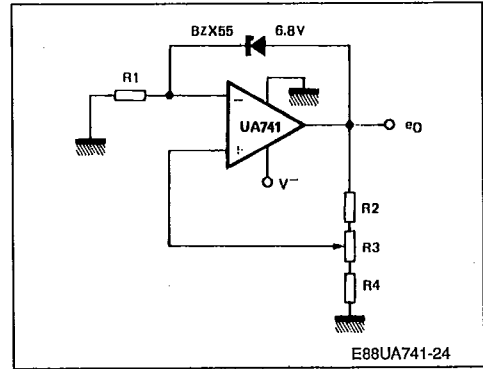
NEUTRALIZING INPUT CAPACITANCE TO OPTIMIZE RESPONSE TIME



POSITIVE VOLTAGE REFERENCE



NEGATIVE VOLTAGE REFERENCE



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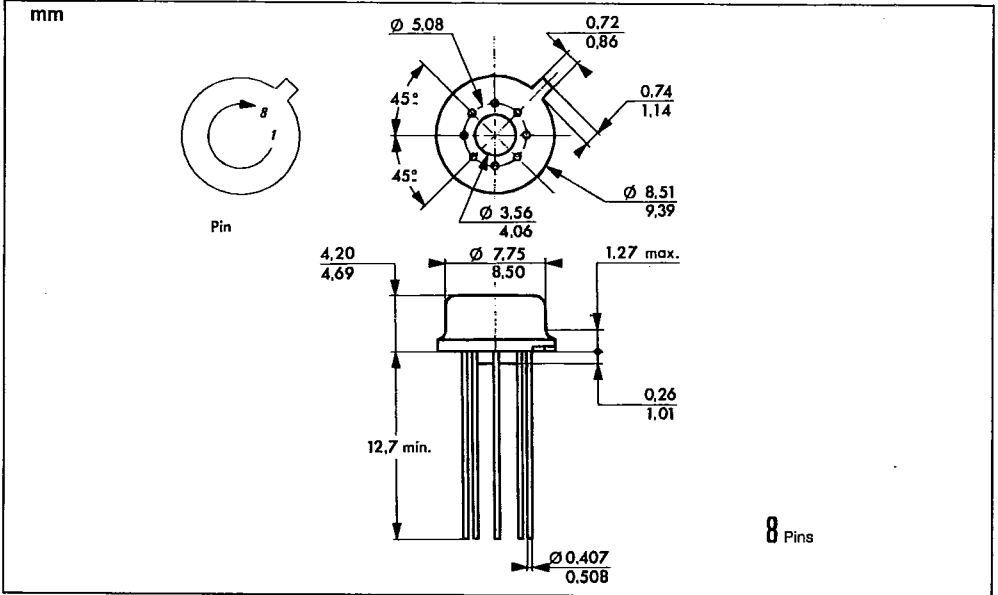


PACKAGE MECHANICAL DATA

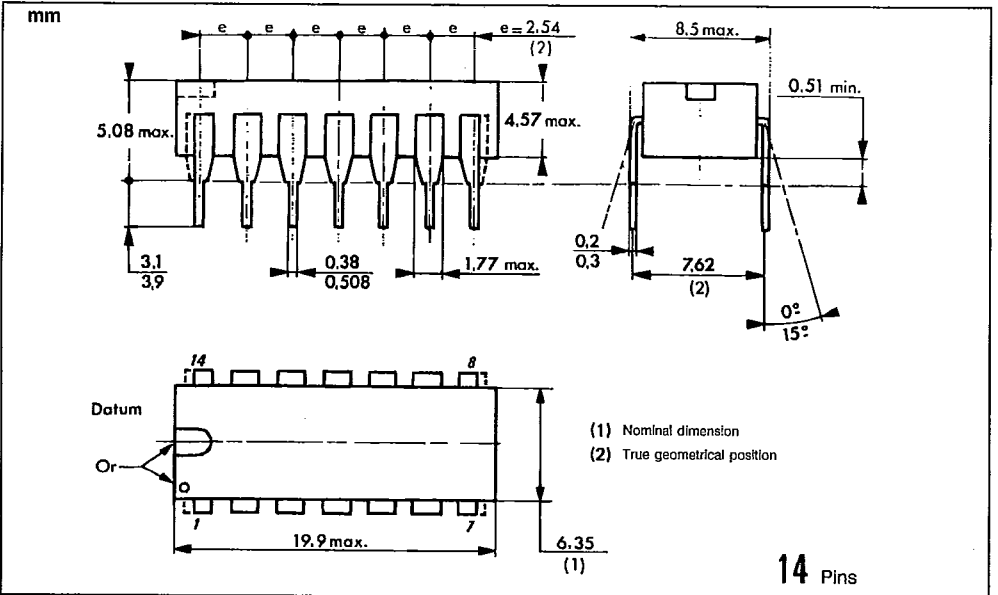
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8 PINS - TO99 - METAL CAN



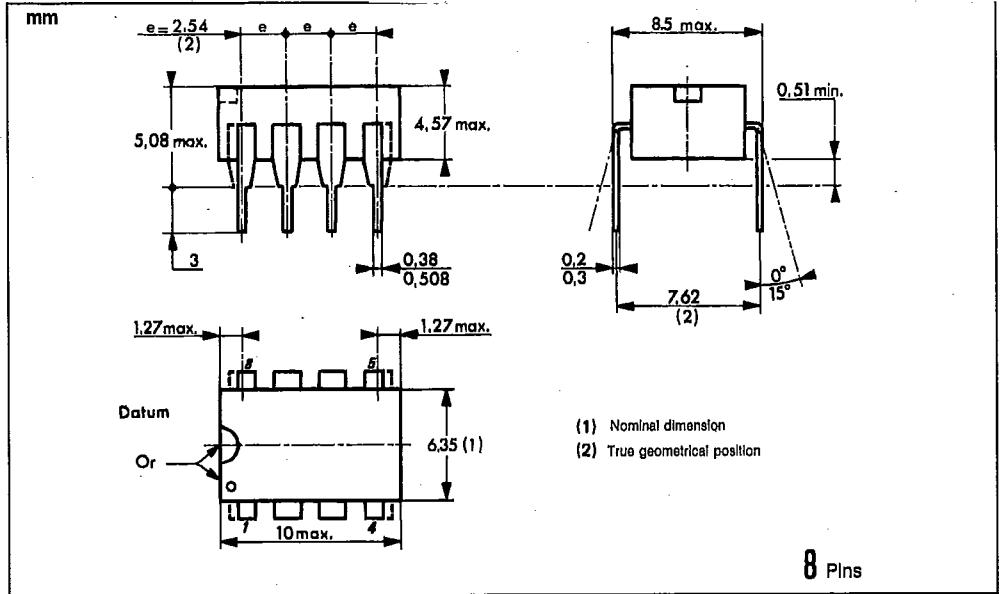
14 PINS - PLASTIC DIP



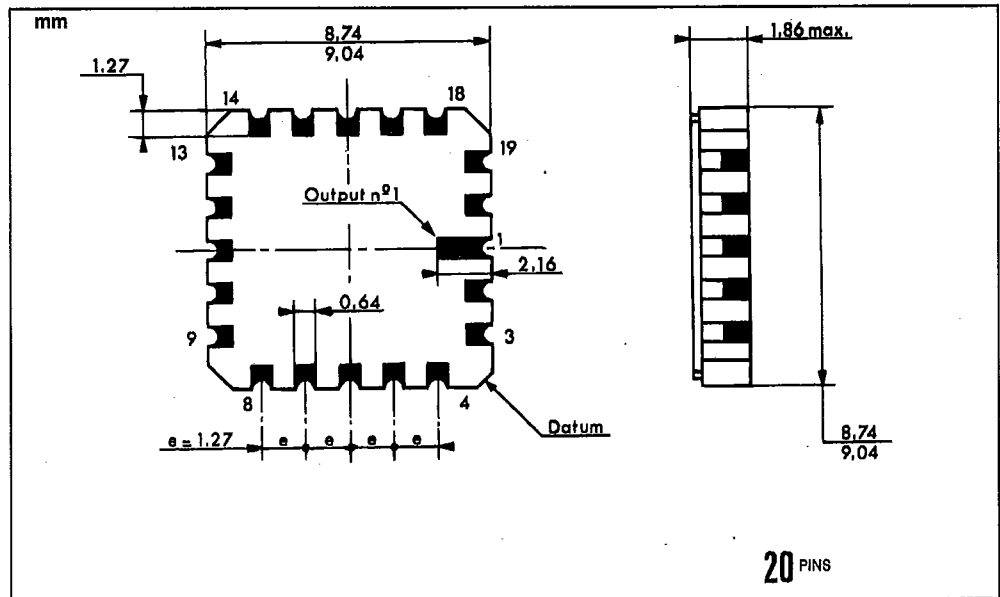
PACKAGE MECHANICAL DATA (continued)

8 PINS - PLASTIC DIP OR CERDIP S G S-THOMSON

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20 PINS - TRICECOP (LOC)



PACKAGE MECHANICAL DATA (continued)

8 PINS - PLASTIC MICROPACKAGE (SO) S G S-THOMSON

30E D

